Physical therapy evaluation and treatment of a 59-year-old female with open reduction and internal fixation of left femoral neck fracture with osteoporosis: CASE REPORT

By

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Abstract

Background and Purpose: This case report presents evidence-based physical therapy assessments and interventions for a patient with open reduction internal fixation of left hip fracture with osteoporosis. The case demonstrates the importance of reassessment and outcome measures to help determine whether the plan of care requires change due to the patient's complication or continues as originally planned initially.

Case Description: The patient is a 59-year-old female with symptoms of pain, decreased range of motion, muscular strength, balance issue, and endurance of left lower extremity. The examination and treatment were focused on building strength, increase range of motion, and improve endurance which limits normal functional mobility and increases pain.

Outcomes: The outcome measure demonstrates the patient's pain is well under control. The patient's lower extremity strength and risk of fall remain relatively the same base on the 30-second sit-to-stand and timed up and go tests, but she was able to perform the tests with better form compare to the initial exam. However, she rated her LEFS at 50% of max function, which showed the patient's low confidence and fears performing daily activities.

Discussion: Although the patient did not reach the goals according to the protocol, the physical therapists and patient's primary physician believe she is progressing at a fair pace at her first 6 months follow up after post-op after her 6^{th} therapy session. This is mainly due to the patient's health complications and her ability before the accident. Several limitations can be addressed to improve the validity of the case report.

Key Words: Femoral neck fracture, osteoporosis, outcome measures, ORIF, protocol

Introduction

The hip joint is composed of a ball and socket joint with the femoral head aligned with the pelvic acetabulum. The joint stability is achieved by the surrounding ligaments and musculatures that attach the pelvis to the femur. The femoral artery, one of the largest arteries in the body, branches into the medial and femoral circumflex arteries and provide the majority of blood supply for the femoral joint.

A femoral neck fracture is a break in the upper portion of the femur. Most femoral neck fractures occur in the elderly population secondary to a fall or twisting injury. It is also seen in the younger population who perform in athletic activities or experience high-energy trauma. Immediate diagnosis and management are important to prevent complications in the area.

Hip fractures are associated with the quality of life, which affects the mortality of the patients. The first year after a hip fracture is the most critical time for the patients. Recent researched demonstrated about 12% to 17 % of the patients with a hip fracture die within the first year of injury, and the long-term relative risk of mortality in the elderly population increases by about 4% per year[1]. Of the patients that survive, only about half can ambulate independently[2]. Regarding functional activities, 50% of the patients can recover their activities of daily living before the fracture and 25% of the patients have full recovery over their instrumental activity of daily living[3].

Non-modifiable risk factors of hip fractures include female gender and age. As the age increases pasts 65 years of age, the likelihood of hip fractures also increases. Modifiable risk factors include a reduced level of activity, chronic medication use, diseases such as osteoporosis, low bone density, or falls. Falls usually occurred due to reduced reaction time and overall strength in

the lower extremities that may be caused by any of the risk factors. With each fall, it creates a fear toward movement, which may lead to decreased activities and mobilities, and increase the chance of fall. The elder population tend to become less active as they age, thus increase the risk of a fracture.

The physical therapist's role involves multiple objectives identifies the patient's disability, risk of fall, facilitate rehabilitation progress, reduce the risk of re-injury or injury of the contralateral hip, and management of comorbidity conditions. Most of these fractures occur in patients 65 years or older who are injured in household or community falls. Each year, more than 300,000 people in the United States are hospitalized due to a hip fracture[4]. The economic burden is amongst the top 20 expensive diagnoses, with approximately 20 billion dollars were invested in the management of the injury[5]. Thus, the physical therapists' job also includes education on prevention of falls, modification of activities, and promotes mobility of the elder population.

This case report will be focused on evidence-based physical therapy examination and management of post-operational rehabilitation progress of a femoral neck fracture. However, due to the patient's medical complication of osteoporosis and gastro-esophageal reflux problem, the patient's progress of healing may be delayed. Therefore, adjustment of physical therapy treatment throughout the plan of care and modification of daily life is required for the patient to regain functional activities and prevent future reinjury.

Case Description

The patient was a 59-year-old Caucasian female referred to physical therapy for post-op surgery of an open reduction and internal fixation (ORIF) of left femoral neck fracture. The incident occurred on 04/15/2021 when her cat jumped on her and caused her to fall on her hip. She was diagnosed with a hip fracture and sent to surgery immediately after the incident to prevent further complications. The patient is safe to weight bear as tolerated with her left lower extremity per the doctor's order post-surgery. The patient initially received care from another physical therapy clinic first, then transferred to Lyndon B. Johnson (LBJ) Hospital outpatient rehab clinic. She is under the care of a geriatrician affiliated with Harris Health Ben Taub General and LBJ Hospitals. The same hospital system as the physical therapy department she is having treatment at.

The patient was not working at the time of physical therapy. She lives alone by herself in a mobile home with three concrete steps and rails on both sides going into the house. The patient participated in yard works and taking care of her cats as her leisure activities. The patient complains of moderate pain along the left femur with weight-bearing and movement.

At initial evaluation and throughout her episode of care, a dietician evaluation was recommended to consider her medical history of gastroesophageal reflux disease. She was able to have several sessions with the dietician to assist with her dietary problems in between her physical therapy visits.

Examination

The patient was 1.651 m tall and weighed 44 kg (BMI 16.14 kg/m^2). Her blood pressure at the time of the initial evaluation is at 116/68 with an average heart rate of 76 beats per minute. She had a medical history of gastroesophageal reflux disease, osteoporosis, and thyroid cancer with thyroidectomy in 2021. During the initial evaluation, the patient presents to the clinic with a 4-wheeled rolling walker and a cane. Due to the pain and previous experience of fall, the patient fear of doing too much and breaking her hip with weight-bearing activities.

The initial evaluation focused on a range of motion, muscle strength functional assessments, pain, and gait. The patient denies recent history of infection, fever, night pain, headaches, changes in vision, difficulty breathing or chest pain, and recent weight loss. During gait assessment, she demonstrates the ability to walk without the cane, but utilizes short steps to patterning, with and without an assistive device. The lower extremity range of motion was within functional limits in all tested planes. The lower extremity muscle strength is summarized in Table 1. The result of the manual muscle exam demonstrates general weakness in the left lower extremities. This decreased in strength explained the gait abnormalities and would cause difficulty in performing activities of daily living ambulate and transfers. The patient reported pain at 7/10 at worst and a 0/10 at best using the numerical rating scale (NRS)[6]. At the end of the initial evaluation, the patient completed a 30-Second Sit to Stand Test (30STS)[7] and Timed Up and Go Test (TUG)[8] for fall risk assessment with results summarized in Table 2. The prognosis for this patient was good.

At the end of the initial evaluation, the physical therapist discussed diagnosis, prognosis, and importance of compliance with home exercise programs, plan of care and goals and patient agrees, and environmental safety and available caregivers with the patient.

Intervention

The primary goal of physical therapy intervention was to improve the patient's functional movement and mobility. The physical therapist follows the protocols for post-operational ORIF of hip fracture with specific goals and intervention suggestions during each phase of healing. A series of therapeutic exercises are used to build strength, increase range of motion, and improve endurance which limits normal functional mobility and increases pain. Neuromuscular re-education is performed to regain balance and proprioception to progress to functional activity movement. And gait training is used to restore functional ambulation patterns to return the patient to fundamental daily activities. The intervention of the patient during each session can be seen in Table 3.

In the first 1 to 2 weeks, immediately postoperatively, the physical therapists' goals are to prevent wound complication, decrease acute symptoms through pain and edema control, teach transfers to avoid movements that stress the fracture or surgery site, improve ambulation skills with or without an assistive device, and facilitation and neuromuscular control of core stability. The patient was able to achieve the goals during this stage of healing and performed home exercise programs without problem in the first two weeks of physical therapy.

During the next 2 to 6 weeks' timeline, the patient aims to increase mobility, strength, and neuromuscular control of left lower extremity, functional skills, and progress walking distance with an appropriate assistive device and weight-bearing precaution. The patient fatigues easily and was unable to follow the home exercise program at home due to her health complication, thus this stage's goal was not achieved in 6 weeks.

When the patient achieved phase 2's goal, the physical therapist would start the patient with balance and endurance training aims to increase the mobility of the hip joint, dynamic control, and return the patient to prior level activities. The patient will then be discharged with a further home exercise program to continue her healing progression at home when she reached her discharge criteria or when no further improvement can observe with further physical therapy.

Outcomes

The patient's progression of treatment and objective outcome measures at re-evaluation are summarized in Table 2. Patient pain level was under control during reevaluation compares to the initial evaluation. At re-evaluation, the patient completed Lower Extremity Functional Scales (LEFS)[9], 30STS, TUG, and a 6 Minutes Walk Test (6 MWT)[10]. LEFS is used for the patient to self-assess her ability to perform daily activities related to lower extremities. 30STS and TUG are chosen to determine the patient's lower extremities strength and risk of falls. And the 6 MWT is used to determine the patient's ability to walk for a longer distance without the need for a break, this is important to make sure the patient can take care of her such as going to the grocery store.

Discussion

The care report presented evidence-based physical therapy examinations and treatment on a 59-year-old female patient with open reduction and internal fixation of left femoral neck fracture with osteoporosis. The reassessment at the patient's 6th visit helps to determine whether if the patient's progression of healing is according to the plan of care, or adjustment of the plan of care may be required for the following sessions.

Although not much difference improves in the patient's strength, this may be due to the patient's comorbidity and compliance of home exercise at home, she demonstrated improved gait and functional transfer**.** In the LEFS, the patient-rated herself at 50% of max function, this showed the patient still has deficit or fear to perform at least 50% of the daily activities involving the lower extremities. Not much change can be seen through the patient 30STS and TUG, but the patient was able to perform a safer transfer during the test compared to the initial evaluation with or without aid. The 6 MWT showed the patient's ability to ambulate without aid and improvement with consistent activities, even though the result is below the expectation, she did not report the need for a break during or fatigue at the end of the test. These outcome measures showed the patient's motivation to regain her functional activities and the activities she may still have trouble performing.

The patient did not achieve the goals set according to the protocol the physical therapists are following. However, the physical therapists and patient's primary physician believe she is progressing at a fair pace at her first 6 months follow up after post-op after her 6th therapy session.

The limitation of this case report would be that the clinical rotation ended before the termination of the patient's therapy session. Thus, the data of final reassessment to determine the patient's improvement was not recorded. Besides this main limitation, other variables also affected the patient's progression of healing. For example, the patient was easily fatigue during her physical therapy sessions and often request a short break before continuing to the next intervention. This may be due to the complication of the patient's diet and may not be easily fixed without a close monitor of the patient's daily activities and dietary input. Another limitation of this study is the fact that the patient originally comes from another clinic, thus the initial evaluation may not be assessed as closely as the reassessment.

Patient Perspective

Acknowledgments

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Tables and Figures

Table 1. Objective test measure

	Initial Evaluation (05/12/2021)	**Re-Evaluation (06/28/2021)**		
Range of Motion	Within Normal Limit	Within Normal Limit		
Manual Muscle Test	Hip Flexion: within normal limit, bilaterally Hip Extension: withing normal limit, bilaterally Hip Abduction: Left, 4-, unable to attain full knee E ROM Knee Flexion: withing normal limit, bilaterally Knee Extension: withing normal limit, bilaterally Quadricep: L, lag with straight leg raise. Increase lag with bridge, 75% range of motion with shaking		Left	Right
		Hip Flexion	2+	3+
		Hip Abduction	3+	3+
		Hip Adduction	3+	3+
		Knee Flexion	3+	3+
		Knee Extension	3+	3+

Table 2. Outcome Measures

	Initial Evaluation (05/12/2021)		**Re-Evaluation (06/28/2021)**	
Numerical Rating Scale	7/10 at worst, 0/10 at best		5/10 at worst, 0/10 at best	
Range of Motion	Within Normal Limit		Within Normal Limit	
Manual Muscle Test	Hip Flexion: within normal limit, bilaterally Hip Extension: withing normal limit, bilaterally Hip Abduction: Left, 4-, unable to attain full knee E ROM Knee Flexion: withing normal limit, bilaterally Knee Extension: withing normal limit, bilaterally Quadricep: L, lag with straight leg raise. Increase lag with bridge, 75% range of motion with shaking			Left / Right
			Hip Flexion	2+ / 3+
			Hip Abduction	3+ / 3+
			Hip Adduction	3+ / 3+
			Knee Flexion	3+ / 3+
			Knee Extension	3+ / 3+
30-second Sit-to-Stand	7 times		7 times	
Timed Up and Go	With Cane	Without Cane	With Cane	Without Cane
	20 seconds	Not assessed	20 seconds	34 seconds
	18 seconds	Not assessed	19 seconds	34 seconds
Lower Extremities Functional Scale	Not assessed		50% of maximal function	

6 Minutes Walk	Not assessed	194.46 meter (638 feet)

Table 3. Physical Therapy Interventions

Session #	Intervention	
Session 1 (05/20/2021)	Therapeutic Exercises	a. Bike @ lvl 0 x 8 min b. Bridges x 10 reps c. Heel slides x 5 min d. Long Arc Quad x 10 reps x 3 sec hold e. Lower Trunk Rotations x 4 min f. Clamshell x 15 reps
Session 2 (05/27/2021)	Therapeutic Exercises	a. Practice Sit-to Stand form b. Discussed exercises with a walker
Session 3 (06/10/2021)	Therapeutic Exercises	a. Bike @ lvl 1 x 10 min b. Bridges x 10 reps x 2 sets c. Clamshells x 10 reps x 2 sets d. Heel slides x 10 reps x 2 sets e. Sit-to-Stand 10 reps x 2
Session 4 (06/17/2021)	Therapeutic Exercises	a. Bike @ lvl 1 x 5 min b. Clamshells x 10 reps x 2 sets c. Stand Heel Raises x 15 reps d. Total Gym @ lvl 25 x 5 min: to progress to squat exercises
	Neuromuscular Re-Education	a. Single leg step up with 4” step x 15 reps bilateral
Session 5 Re-Evaluation (06/28/2021)	Therapeutic Exercises	a. Sitting marching x 15 reps
Session 6 (07/08/2021)	Therapeutic Exercises	a. 6 MWT: 638 feet (194.46 meter) b. Total Gym @ lvl 21 x 8 min
	Neuromuscular Re-Education	a. Single leg step touch 12” step x 15 reps x 2 sets bilateral
Session 7 (07/19/2021)	Therapeutic Exercises	a. Bike @ lvl 2 x 10 min b. Sit-to-Stand with TRX x 10 reps
	Neuromuscular Re-Education	a. Single leg step up with 6” step x 15 reps bilateral
	Gait Training	a. Ambulation with step-over cone (30 meter)

Appendixes